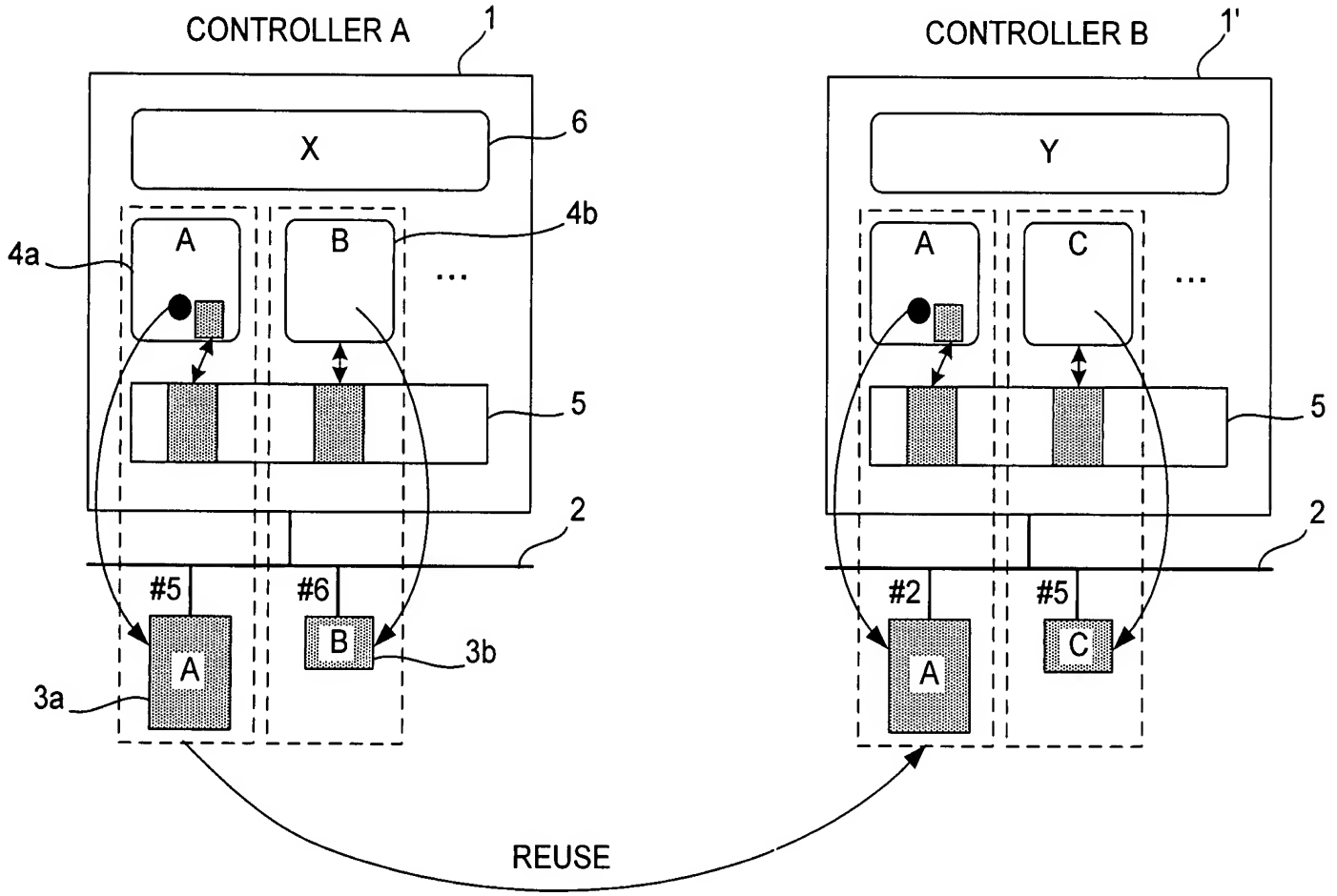

FIG. 1
(PRIOR ART)

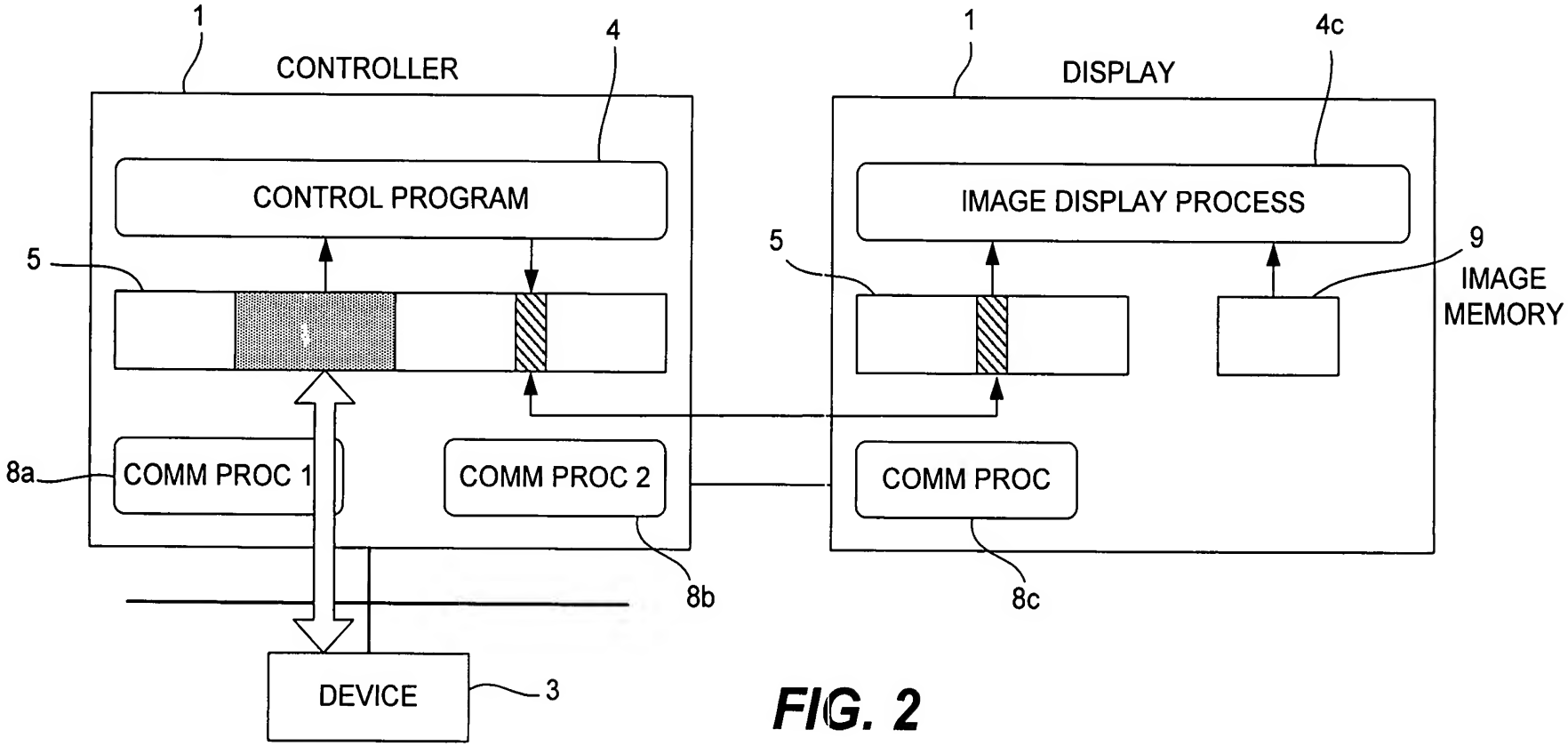

FIG. 2
(PRIOR ART)

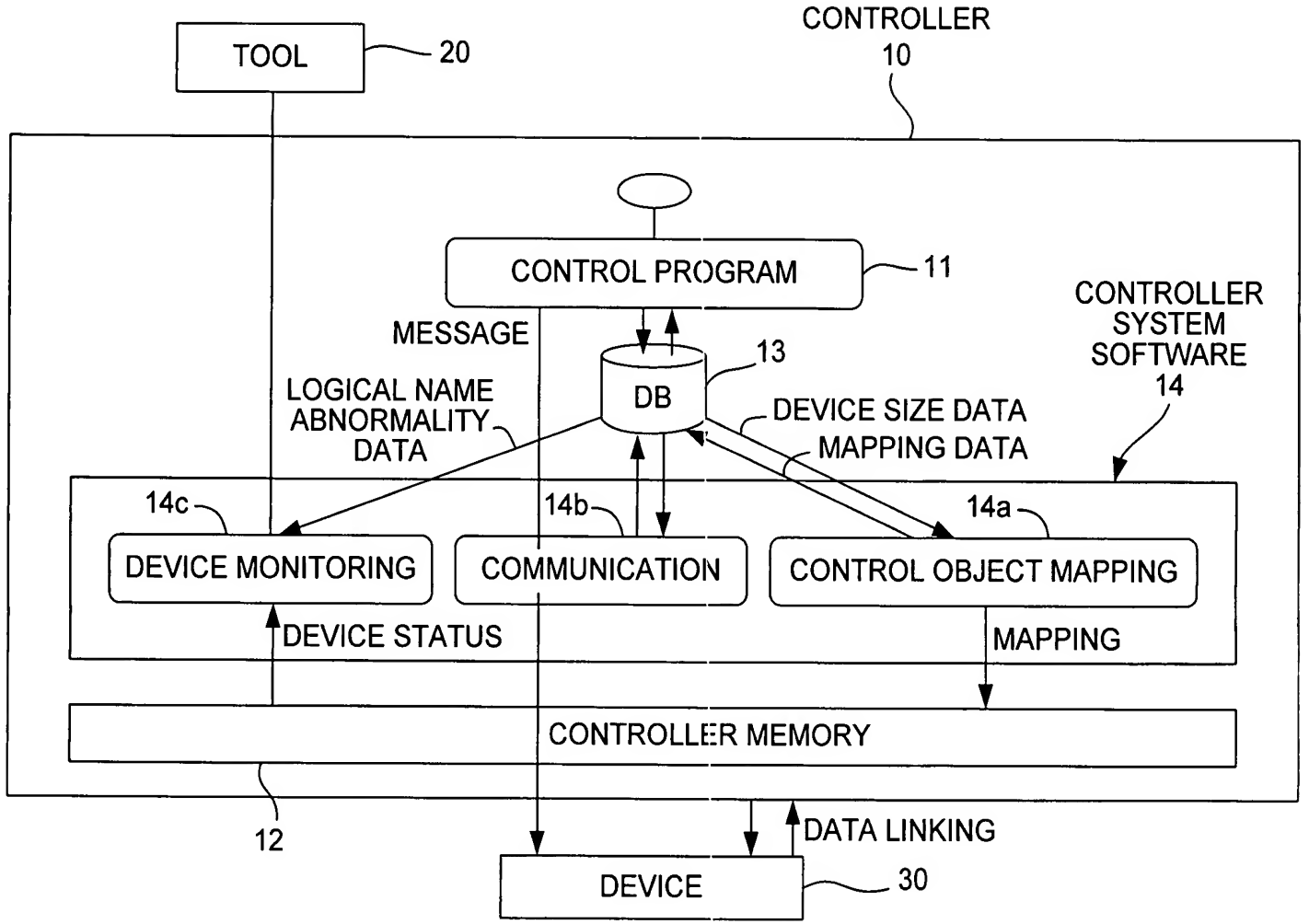
TOOL
20
CONTROLLER
10
CONTROL PROGRAM
11
MESSAGE
13
DB
LOGICAL NAME
ABNORMALITY
DATA
DEVICE SIZE DATA
MAPPING DATA
CONTROLLER
SYSTEM
SOFTWARE
14
14c
14b
14a
DEVICE MONITORING
COMMUNICATION
CONTROL OBJECT MAPPING
DEVICE STATUS
MAPPING
CONTROLLER MEMORY
12
DATA LINKING
DEVICE
30

FIG. 3

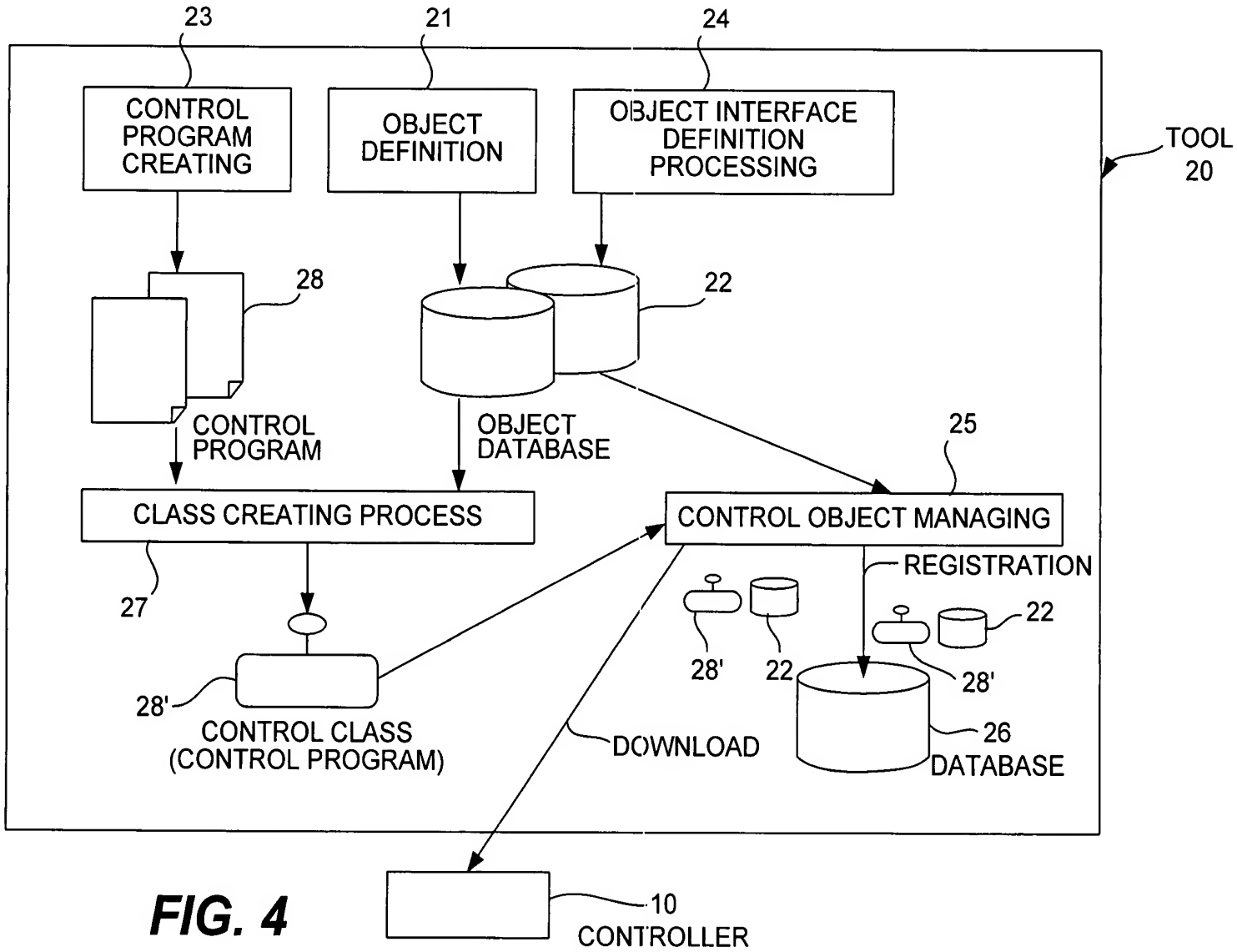
23
21
24
CONTROL PROGRAM CREATING
OBJECT DEFINITION
OBJECT INTERFACE DEFINITION PROCESSING
TOOL 20
28
22
CONTROL PROGRAM
OBJECT DATABASE
25
CLASS CREATING PROCESS
CONTROL OBJECT MANAGING
REGISTRATION
27
28'
22
28'
22
28'
CONTROL CLASS (CONTROL PROGRAM)
DOWNLOAD
26
DATABASE
10
CONTROLLER

FIG. 4

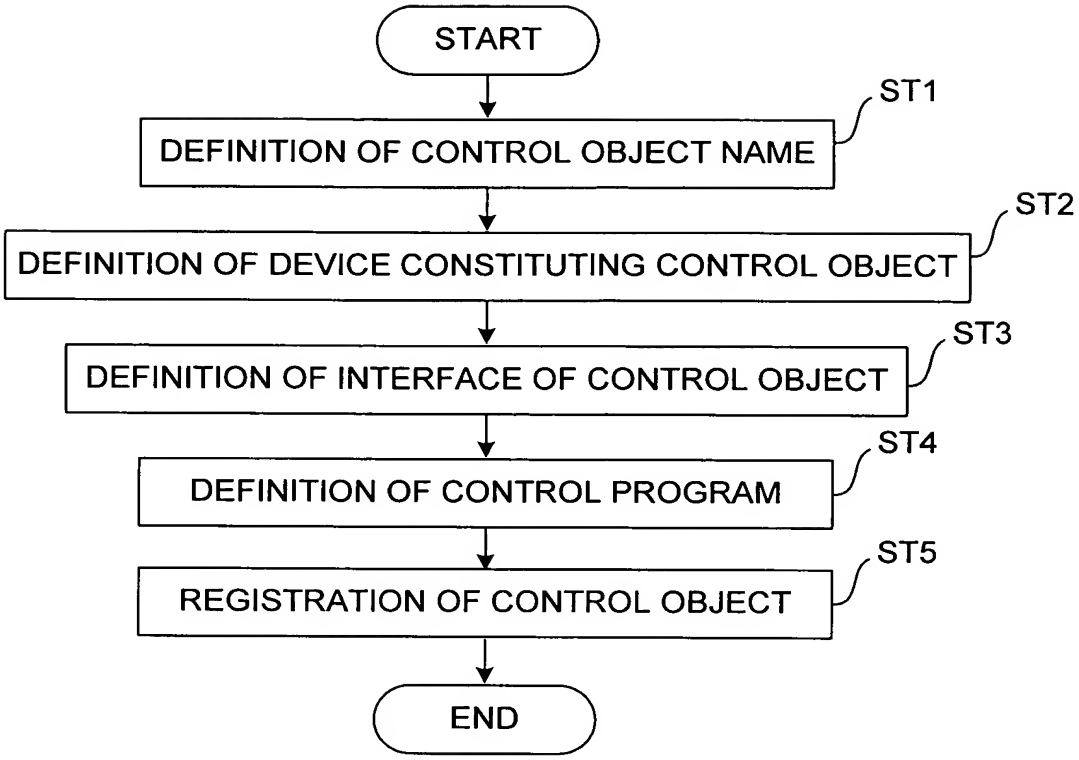
START
ST1
DEFINITION OF CONTROL OBJECT NAME
ST2
DEFINITION OF DEVICE CONSTITUTING CONTROL OBJECT
ST3
DEFINITION OF INTERFACE OF CONTROL OBJECT
ST4
DEFINITION OF CONTROL PROGRAM
ST5
REGISTRATION OF CONTROL OBJECT
END

FIG. 5A

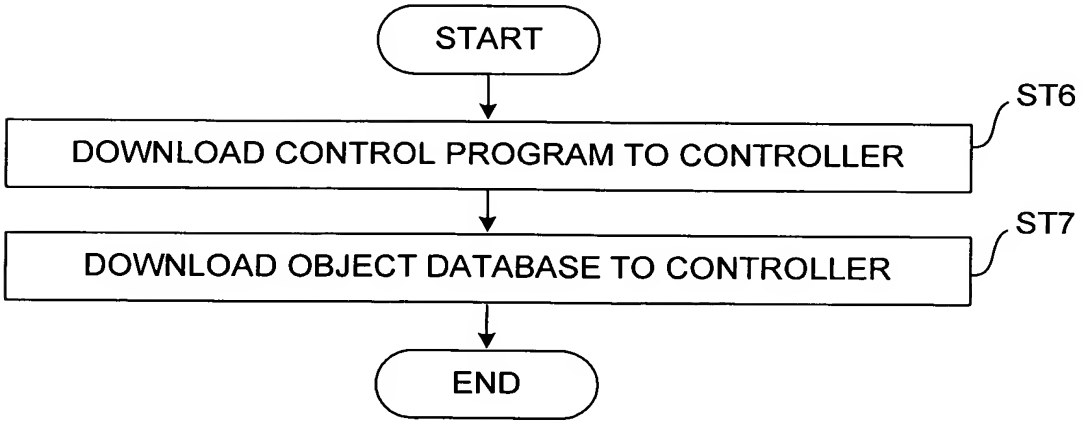
START
ST6
DOWNLOAD CONTROL PROGRAM TO CONTROLLER
ST7
DOWNLOAD OBJECT DATABASE TO CONTROLLER
END

FIG. 5B

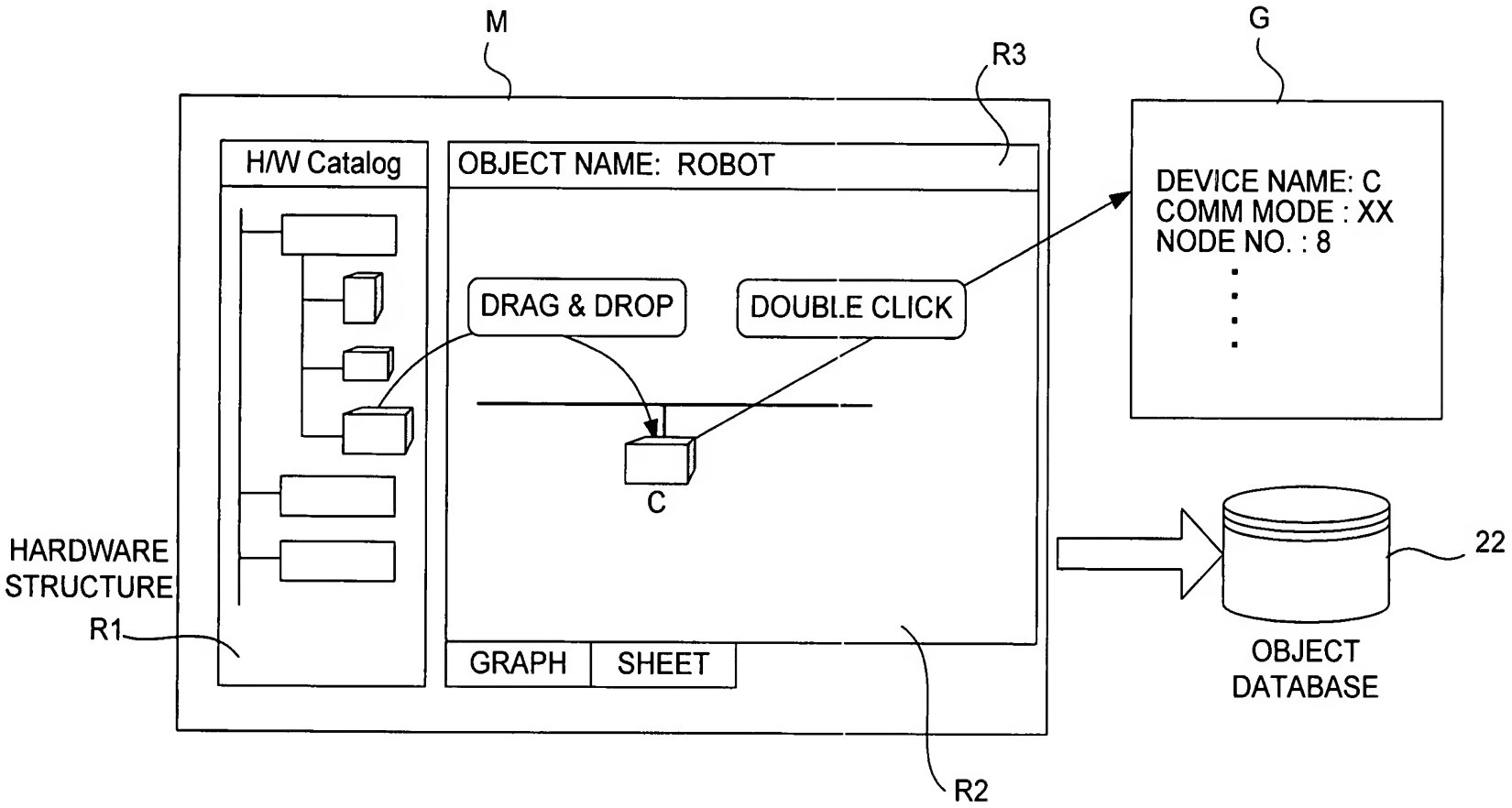
M
R3
G
H/W Catalog
OBJECT NAME: ROBOT
DEVICE NAME: C
COMM MODE : XX
NODE NO. : 8
DRAG & DROP
DOUBLE CLICK
C
HARDWARE
STRUCTURE
R1
22
OBJECT
DATABASE
GRAPH
SHEET
R2

FIG. 6

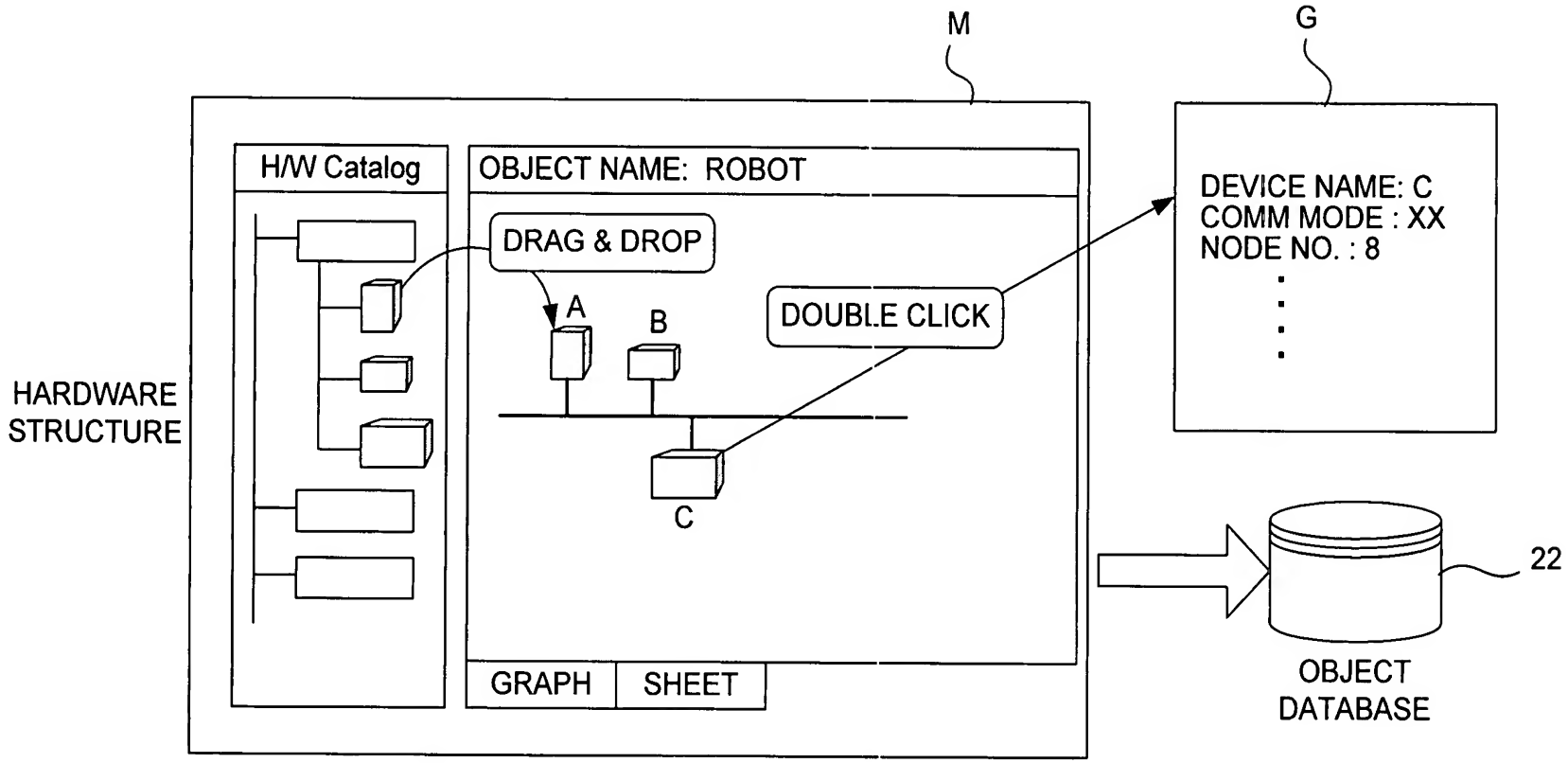
M
G
H/W Catalog
OBJECT NAME: ROBOT
DRAG & DROP
A
B
C
DOUBLE CLICK
DEVICE NAME: C
COMM MODE : XX
NODE NO. : 8
HARDWARE
STRUCTURE
GRAPH
SHEET
22
OBJECT
DATABASE

FIG. 7

```
[Profile]
ObjName= ROBOT

DeviceNum=1
   DevName0=C
   SerialNo0=
   NodeNo0=8  / / COMMUNICATION ADDRESS
   INSize0=2  / /byte
   INadr0=  / / MAPPED ADDRESS TO CONTROLLER MEMORY
   OUTSize0=2  / /byte
   OUTadr0=  / / MAPPED ADDRESS TO CONTROLLER MEMORY
   Communication0=0  / / COMMUNICATION MODE
```

FIG. 8

```
BYTE  Add_Val(BYTE X, BYTE Y)
{
   BYTE A, B; C
   Get_Attribute("IN_param1", A);
   Get_Attribute("IN_param2", B);
   C=A+B
   Set_Attribute("OUT_param1, C);
   Return C
}
```

FIG. 11

```
ObjName= ROBOT

DeviceNum=3
   DevName0=C
   SerialNo0=
   NodeNo0=8
   INSize0=2
   INadr0=
   OUTSize0=2
   OUTadr0=
   Communication0=0

   DevName1=A
   SerialNo1=
   NodeNo1=3
   INSize1=4
   INadr1=
   OUTSize1=4
   OUTadr1=
   Communication1=0

   DevName2=B
   SerialNo2=
   NodeNo2=1
   INSize2=1
   INadr2=
   OUTSize2=1
   OUTadr2=
   Communication2=0
```

FIG. 9

```
[Profile]

ObjName= ROBOT

DeviceNum=1
   DevName0=C
   SerialNo0=
   NodeNo0=8  / / COMMUNICATION ADDRESS
   INSize0=2  / / byte
   INadr0=   / / MAPPED ADDRESS TO CONTROLLER MEMORY
   OUTSize0=2   / / byte
   OUTadr0=  / / MAPPED ADDRESS TO CONTROLLER MEMORY
   Communication0=0   / / COMMUNICATIONS MODE
[Attribute]
IN_Num=2
   ValName0=IN_Param1  / / VARIABLE NAME
   ValSize0=1  / / 1byte  / / VARIABLE SIZE
   Adr0=0/0  / / ADDRESS INSIDE CONTROL OBJECT (0 BIT OF 0 CH)
   ValName1=IN_Param2  / / VARIABLE NAME
   ValSize1=1 / / byte  / / VARIABLE SIZE
   Adr0=0/8  / / ADDRESS INSIDE CONTROL OBJECT (8 BIT OF 0 CH)

OUT_Num=2
   ValName0=OUT_Param1
   ValSize0=1  / / 1byte  / / VARIABLE SIZE
   Adr0=0/0  / / ADDRESS INSIDE CONTROL OBJECT (0 BIT OF 0 CH)
   ValName1=IN_Param2  / / VARIABLE NAME
   ValSize1=1 / / byte  / / VARIABLE SIZE
   Adr0=0/8  / / ADDRESS INSIDE CONTROL OBJECT (8 BIT OF 0 CH)

[SERVICE]
```

FIG. 10

```
[Profile]

ObjName= ROBOT

DeviceNum=1
   DevName0=C
   SerialNo0=
   NodeNo0=8  / / COMMUNICATION ADDRESS
   INSize0=2  / / byte
   INadr0=   / / MAPPED ADDRESS TO CONTROLLER MEMORY
   OUTSize0=2   / / byte
   OUTadr0=  / / MAPPED ADDRESS TO CONTROLLER MEMORY
   Communication0=0   / / COMMUNICATIONS MODE
[Attribute]
IN_Num=2
   ValName0=IN_Param1  / / VARIABLE NAME
   ValSize0=1  / / 1byte  / / VARIABLE SIZE
   Adr0=0/0  / / ADDRESS INSIDE CONTROL OBJECT (0 BIT OF 0 CH)
   ValName1=IN_Param2  / / VARIABLE NAME
   ValSize1=1 / / byte  / / VARIABLE SIZE
   Adr0=0/8  / / ADDRESS INSIDE CONTROL OBJECT (8 BIT OF 0 CH)

OUT_Num=2
   ValName0=OUT_Param1
   ValSize0=1  / / 1byte  / / VARIABLE SIZE
   Adr0=0/0  / / ADDRESS INSIDE CONTROL OBJECT (0 BIT OF 0 CH)
   ValName1=IN_Param2  / / VARIABLE NAME
   ValSize1=1 / / byte  / / VARIABLE SIZE
   Adr0=0/8  / / ADDRESS INSIDE CONTROL OBJECT (8 BIT OF 0 CH)

[SERVICE]
   ServiceNum=1
   ServiceName0=BYTEAdd_Val([IN]BYTE  X[IN]BYTE  Y)
```

FIG. 12

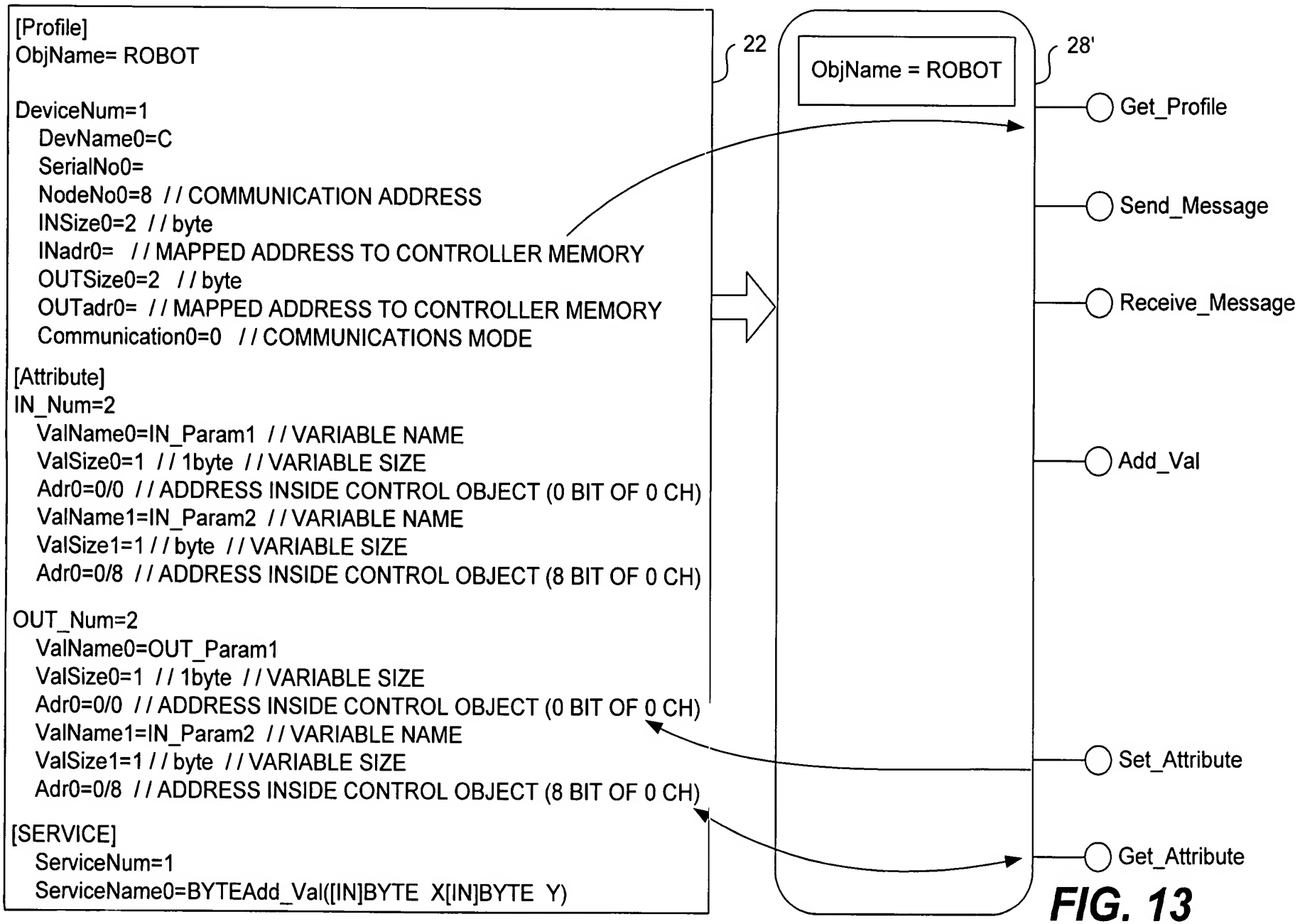
[Profile]
ObjName= ROBOT
DeviceNum=1
DevName0=C
SerialNo0=
NodeNo0=8 / / COMMUNICATION ADDRESS
INSize0=2 / / byte
INadr0= / / MAPPED ADDRESS TO CONTROLLER MEMORY
OUTSize0=2 / / byte
OUTadr0= / / MAPPED ADDRESS TO CONTROLLER MEMORY
Communication0=0 / / COMMUNICATIONS MODE
[Attribute]
IN_Num=2
ValName0=IN_Param1 / / VARIABLE NAME
ValSize0=1 / / 1byte / / VARIABLE SIZE
Adr0=0/0 / / ADDRESS INSIDE CONTROL OBJECT (0 BIT OF 0 CH)
ValName1=IN_Param2 / / VARIABLE NAME
ValSize1=1 / / byte / / VARIABLE SIZE
Adr0=0/8 / / ADDRESS INSIDE CONTROL OBJECT (8 BIT OF 0 CH)
OUT_Num=2
ValName0=OUT_Param1
ValSize0=1 / / 1byte / / VARIABLE SIZE
Adr0=0/0 / / ADDRESS INSIDE CONTROL OBJECT (0 BIT OF 0 CH)
ValName1=IN_Param2 / / VARIABLE NAME
ValSize1=1 / / byte / / VARIABLE SIZE
Adr0=0/8 / / ADDRESS INSIDE CONTROL OBJECT (8 BIT OF 0 CH)
[SERVICE]
ServiceNum=1
ServiceName0=BYTEAdd_Val([IN]BYTE X[IN]BYTE Y)
22
ObjName = ROBOT
28'
Get_Profile
Send_Message
Receive_Message
Add_Val
Set_Attribute
Get_Attribute

FIG. 13

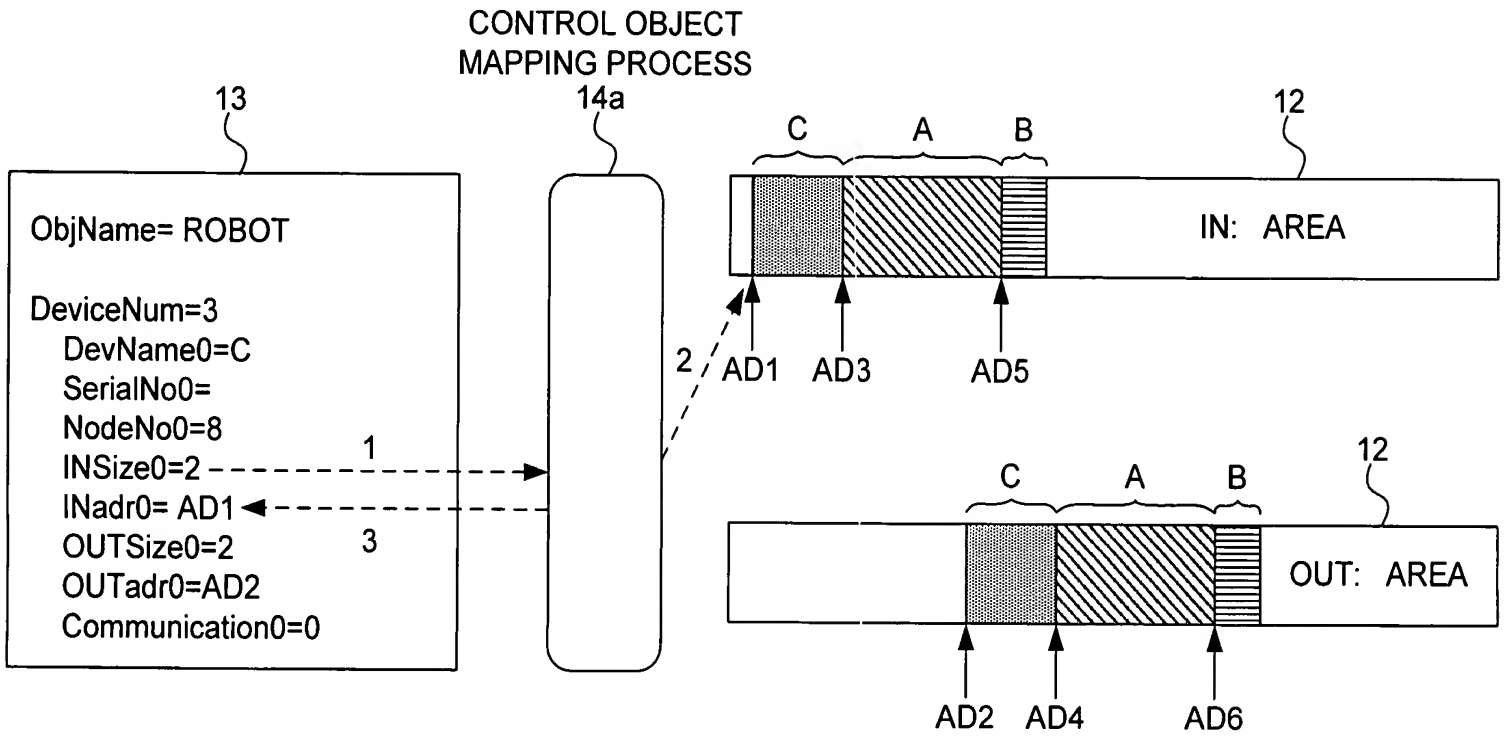
CONTROL OBJECT
MAPPING PROCESS
13
14a
12
C
A
B
ObjName= ROBOT
DeviceNum=3
DevName0=C
SerialNo0=
NodeNo0=8
INSize0=2
INadr0= AD1
OUTSize0=2
OUTadr0=AD2
Communication0=0
1
2
3
AD1
AD3
AD5
IN: AREA
AD2
AD4
AD6
OUT: AREA

FIG. 14

```
ObjName= ROBOT

DeviceNum=3
  DevName0=C
  SerialNo0=SN-01
  NodeNo0=8
  INSize0=2
  INadr0= AD1
  OUTSize0=2
  OUTadr0=AD2
  Communication0=0
  DevName1=A
  SerialNo1=
  NodeNo1=3
  INSize1=4
  INadr1= AD3
  OUTSize1=4
  OUTadr1=AD4
  Communication1=0
  DevName2=B
  SerialNo2=
  NodeNo2=1
  INSize2=1
  INadr2= AD5
  OUTSize2=1
  OUTadr2=AD6
  Communication2=0
```

FIG. 15

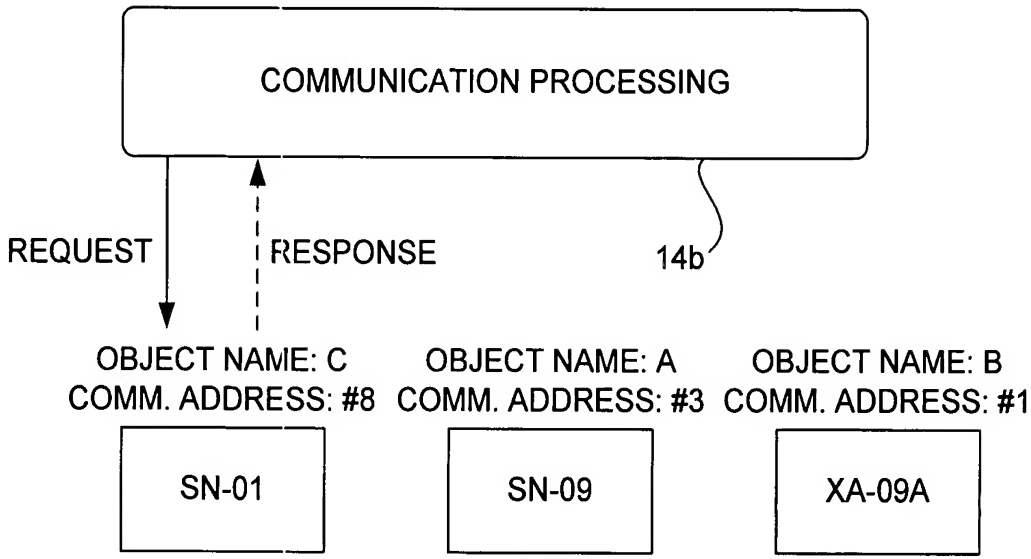

FIG. 16

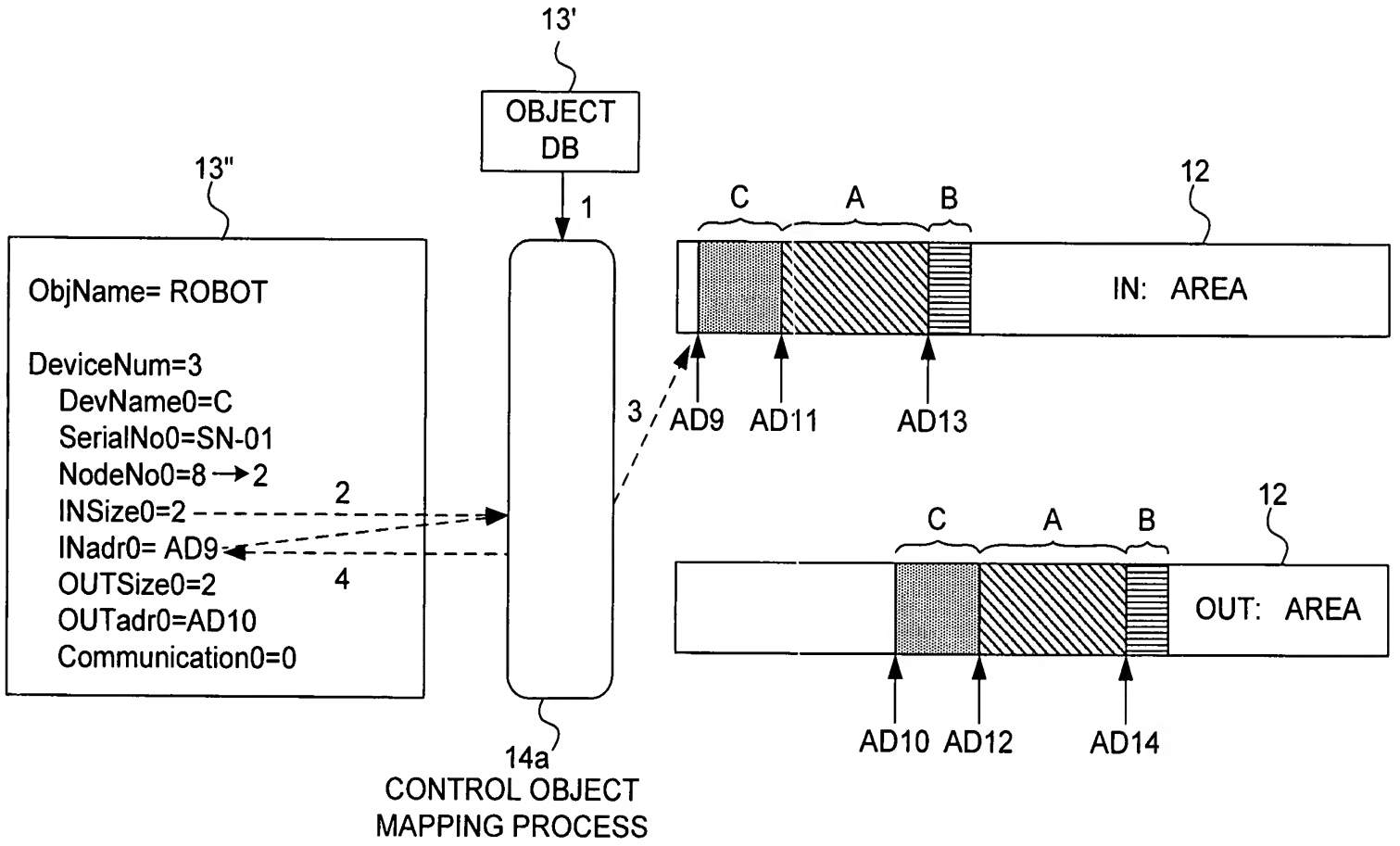
13'
OBJECT
DB
13"
1
C
A
B
12
ObjName= ROBOT
DeviceNum=3
DevName0=C
SerialNo0=SN-01
NodeNo0=8→2
INSize0=2
INadr0= AD9
OUTSize0=2
OUTadr0=AD10
Communication0=0
2
4
3
AD9
AD11
AD13
IN: AREA
C
A
B
12
OUT: AREA
AD10
AD12
AD14
14a
CONTROL OBJECT
MAPPING PROCESS

FIG. 17

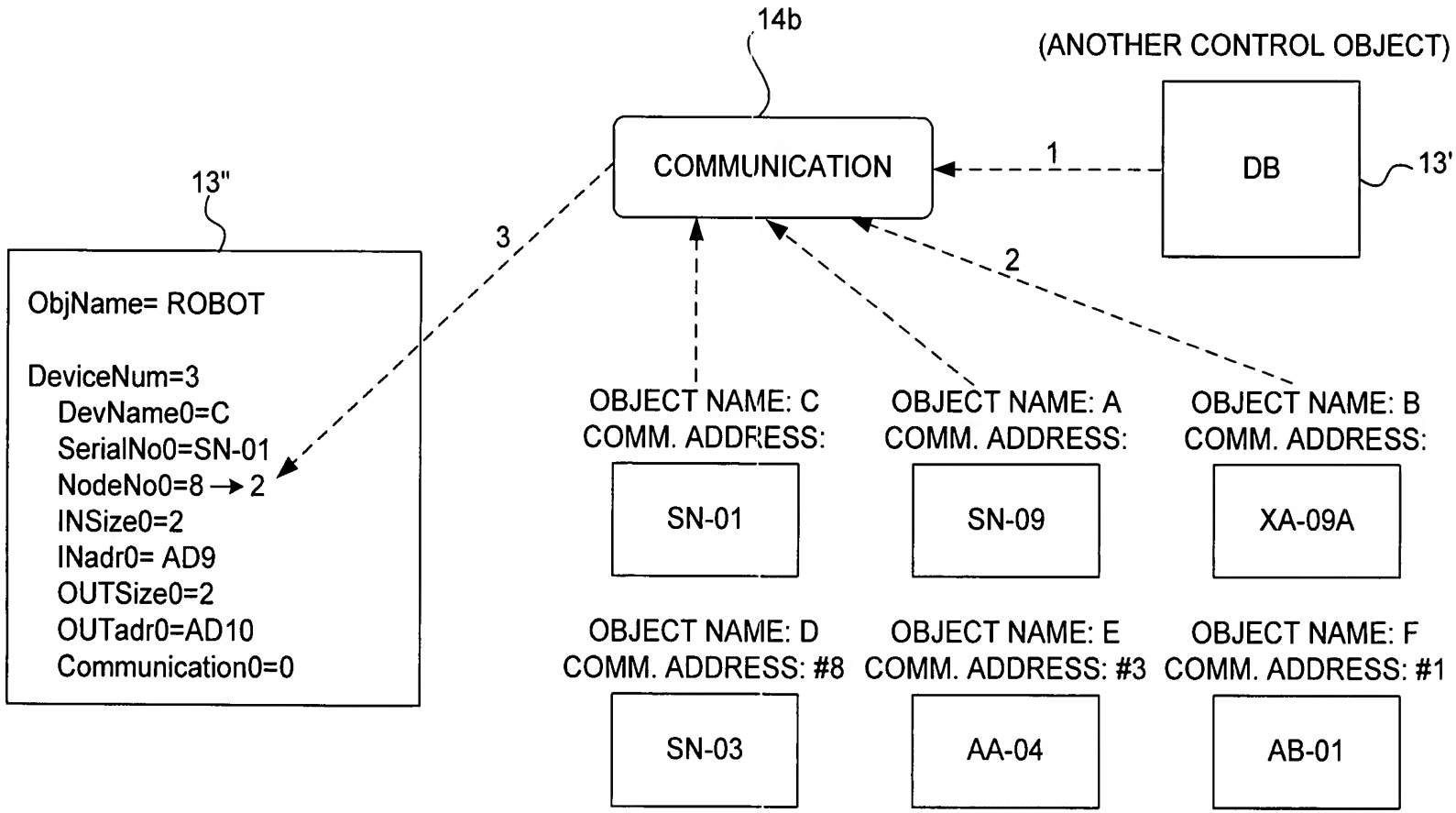
14b
(ANOTHER CONTROL OBJECT)
COMMUNICATION
1
DB
13'
13"
3
2
ObjName= ROBOT
DeviceNum=3
DevName0=C
SerialNo0=SN-01
NodeNo0=8 → 2
INSize0=2
INadr0= AD9
OUTSize0=2
OUTadr0=AD10
Communication0=0
OBJECT NAME: C
COMM. ADDRESS:
SN-01
OBJECT NAME: A
COMM. ADDRESS:
SN-09
OBJECT NAME: B
COMM. ADDRESS:
XA-09A
OBJECT NAME: D
COMM. ADDRESS: #8
SN-03
OBJECT NAME: E
COMM. ADDRESS: #3
AA-04
OBJECT NAME: F
COMM. ADDRESS: #1
AB-01

FIG. 18

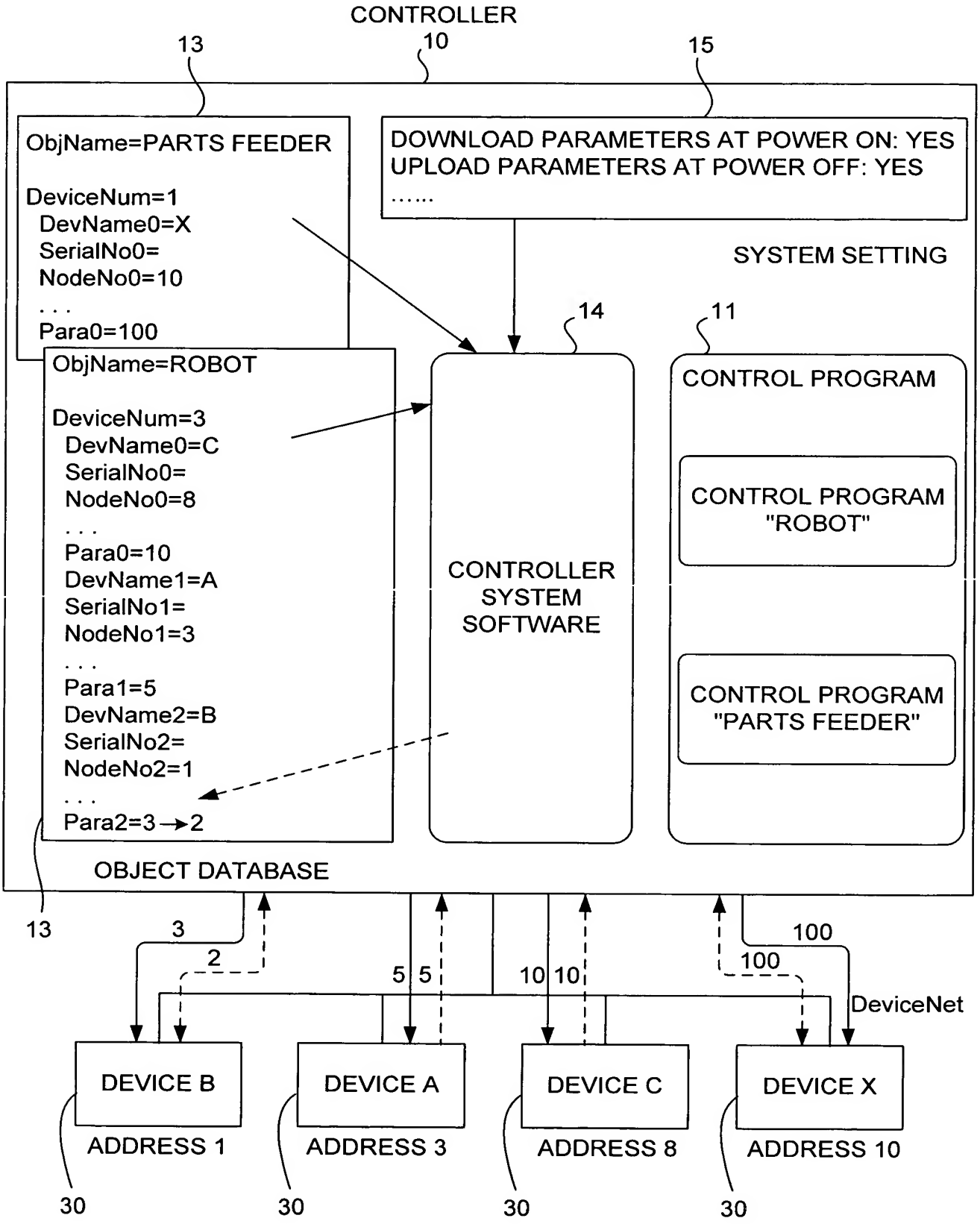
CONTROLLER
13
10
15
ObjName=PARTS FEEDER
DeviceNum=1
DevName0=X
SerialNo0=
NodeNo0=10
. . .
Para0=100
DOWNLOAD PARAMETERS AT POWER ON: YES
UPLOAD PARAMETERS AT POWER OFF: YES
.....
SYSTEM SETTING
14
11
ObjName=ROBOT
DeviceNum=3
DevName0=C
SerialNo0=
NodeNo0=8
. . .
Para0=10
DevName1=A
SerialNo1=
NodeNo1=3
. . .
Para1=5
DevName2=B
SerialNo2=
NodeNo2=1
. . .
Para2=3→2
CONTROLLER SYSTEM SOFTWARE
CONTROL PROGRAM
CONTROL PROGRAM "ROBOT"
CONTROL PROGRAM "PARTS FEEDER"
OBJECT DATABASE
13
3
2
5 5
10 10
100
100
DeviceNet
DEVICE B
DEVICE A
DEVICE C
DEVICE X
ADDRESS 1
ADDRESS 3
ADDRESS 8
ADDRESS 10
30
30
30
30

FIG. 19

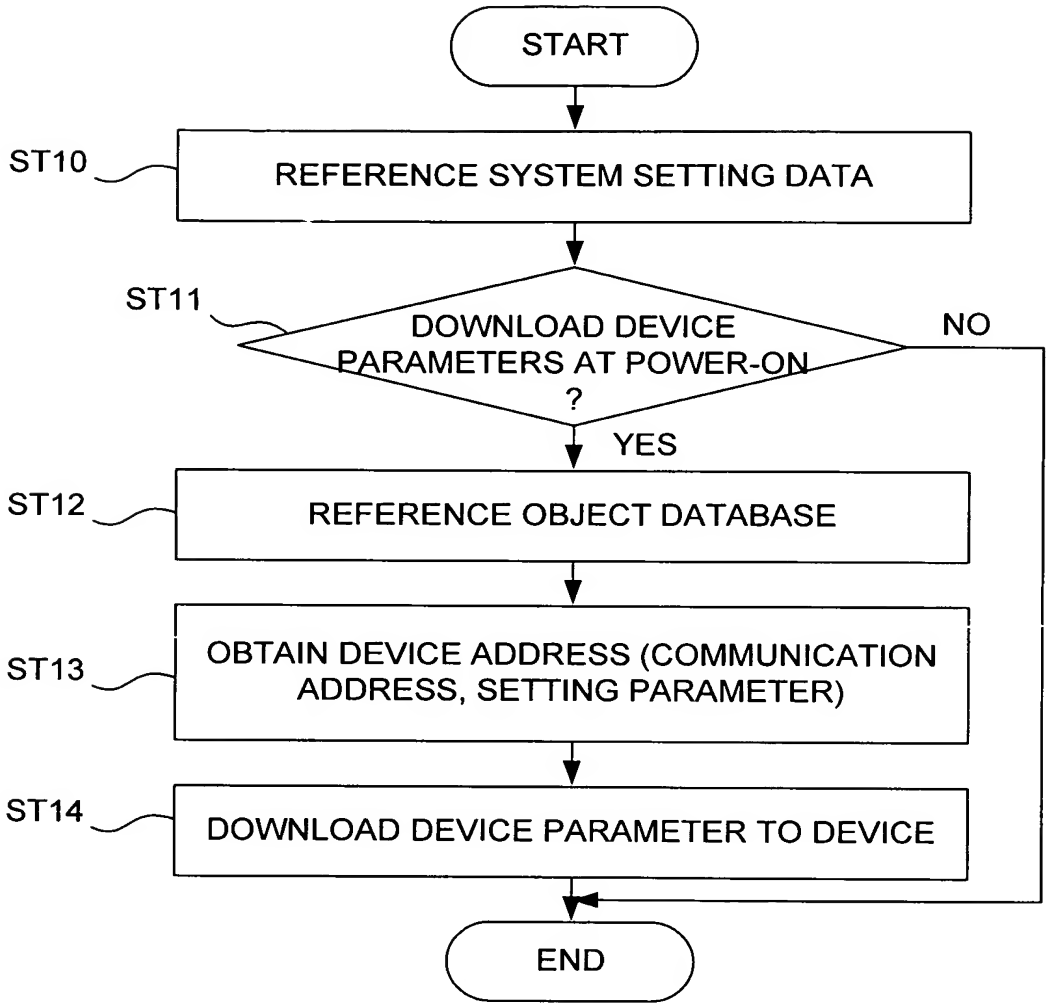
START
ST10
REFERENCE SYSTEM SETTING DATA
ST11
DOWNLOAD DEVICE PARAMETERS AT POWER-ON ?
NO
YES
ST12
REFERENCE OBJECT DATABASE
ST13
OBTAIN DEVICE ADDRESS (COMMUNICATION ADDRESS, SETTING PARAMETER)
ST14
DOWNLOAD DEVICE PARAMETER TO DEVICE
END

FIG. 20

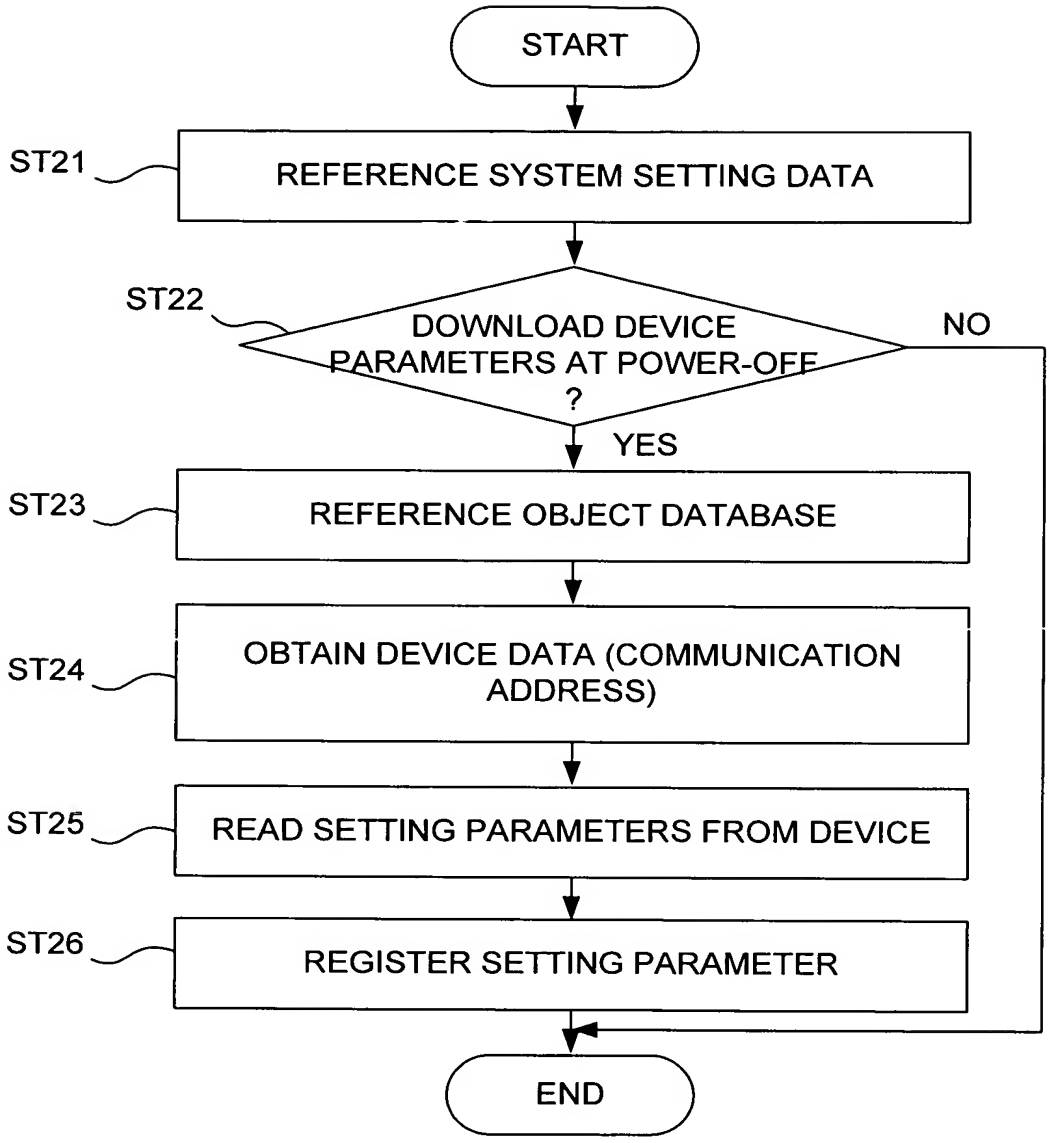
START
ST21
REFERENCE SYSTEM SETTING DATA
ST22
DOWNLOAD DEVICE PARAMETERS AT POWER-OFF ?
NO
YES
ST23
REFERENCE OBJECT DATABASE
ST24
OBTAIN DEVICE DATA (COMMUNICATION ADDRESS)
ST25
READ SETTING PARAMETERS FROM DEVICE
ST26
REGISTER SETTING PARAMETER
END

FIG. 21

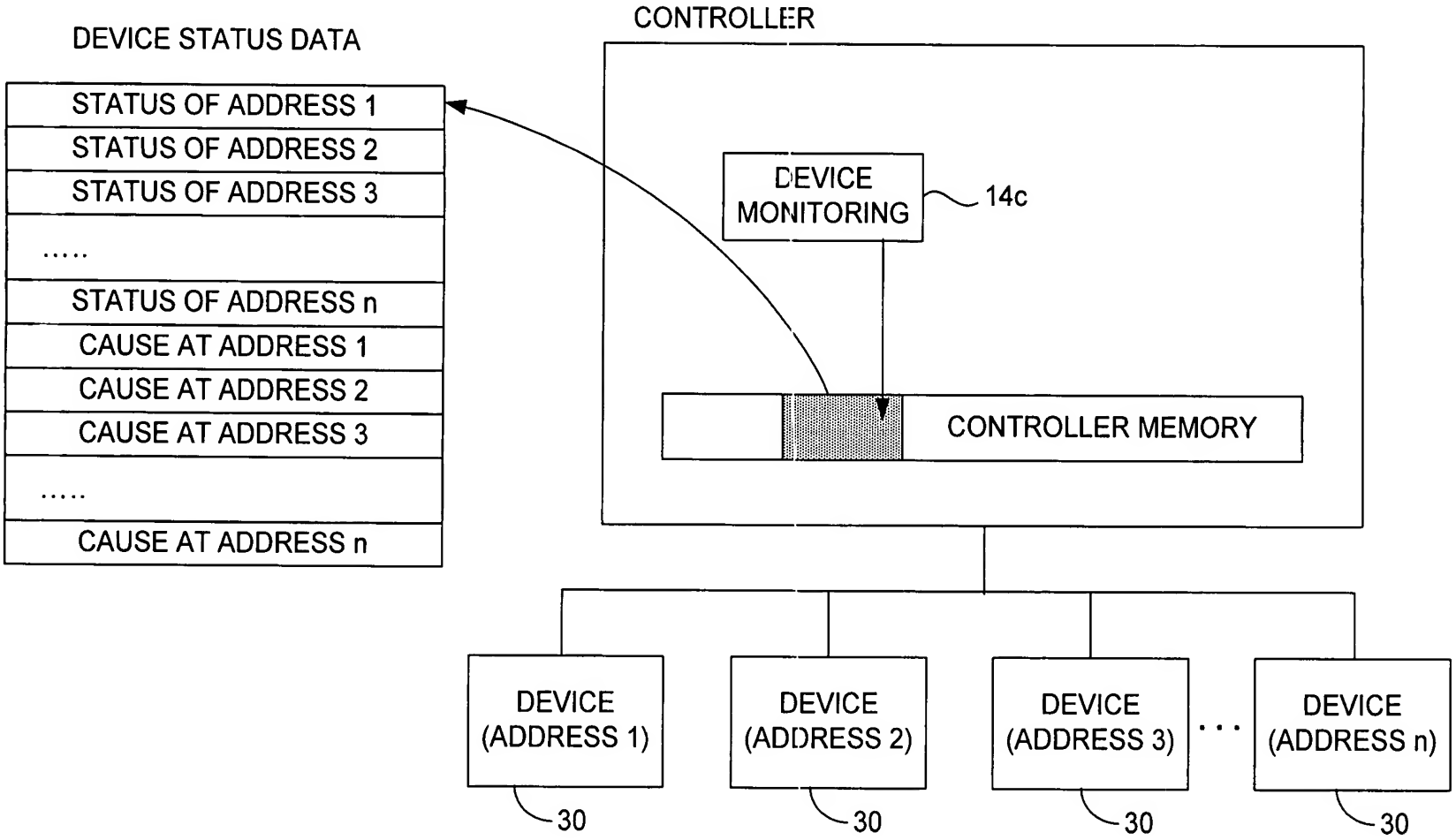
DEVICE STATUS DATA
STATUS OF ADDRESS 1
STATUS OF ADDRESS 2
STATUS OF ADDRESS 3
.....
STATUS OF ADDRESS n
CAUSE AT ADDRESS 1
CAUSE AT ADDRESS 2
CAUSE AT ADDRESS 3
.....
CAUSE AT ADDRESS n
CONTROLLER
DEVICE MONITORING
14c
CONTROLLER MEMORY
DEVICE (ADDRESS 1)
DEVICE (ADDRESS 2)
DEVICE (ADDRESS 3)
DEVICE (ADDRESS n)
30
30
30
30

FIG. 22

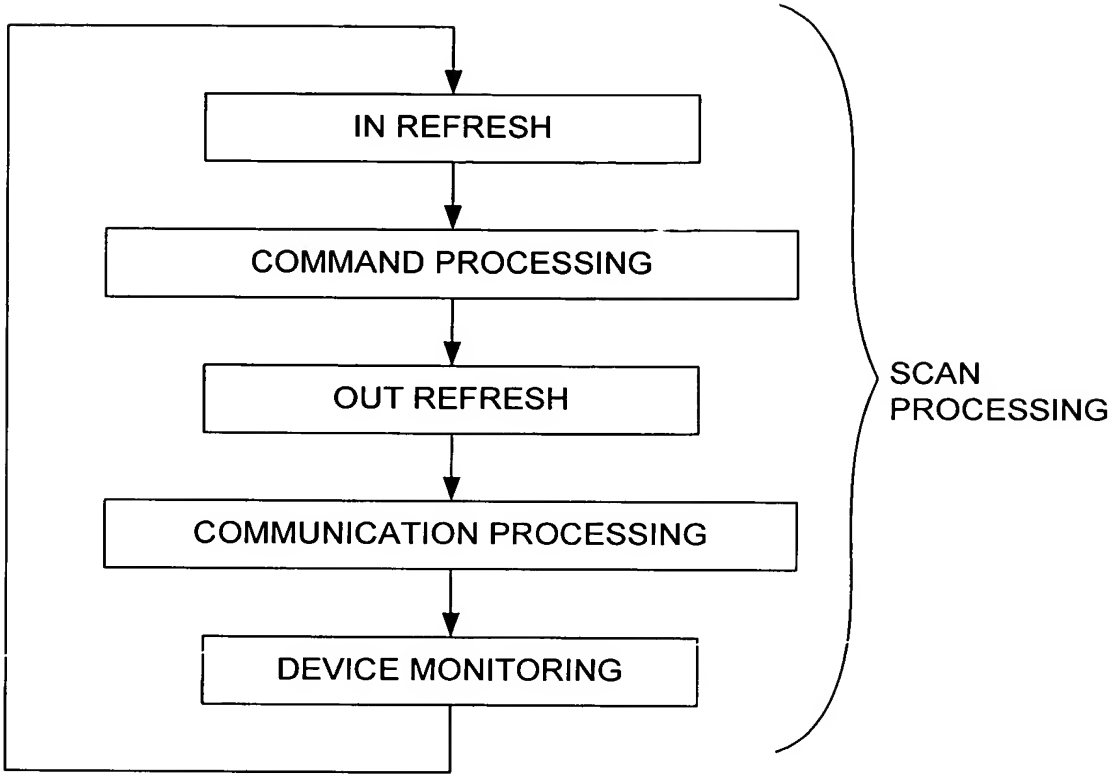
IN REFRESH
COMMAND PROCESSING
OUT REFRESH
COMMUNICATION PROCESSING
DEVICE MONITORING
SCAN
PROCESSING

FIG. 23

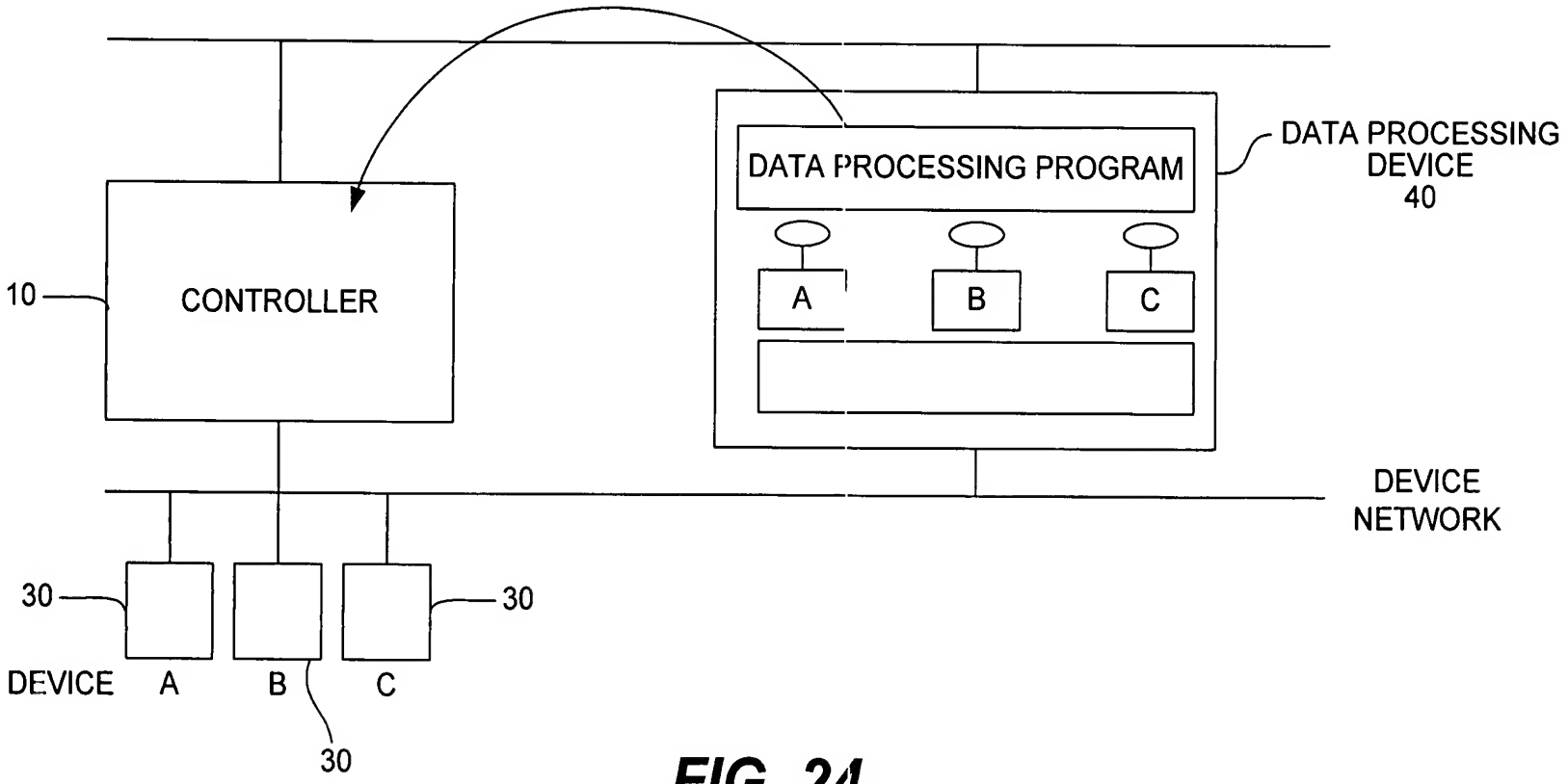
DATA PROCESSING PROGRAM
DATA PROCESSING DEVICE 40
A
B
C
10
CONTROLLER
DEVICE NETWORK
30
30
DEVICE A
B
C
30

FIG. 24